Food Availability Impacts Aggression in Common Terns (*Sterna hirundo)* at a Gulf of Maine Breeding Colony

Amelia Duca[1], Aliya Caldwell[1], Elizabeth Craig[1,2]

1. University of New Hampshire 2. Shoals Marine Laboratory

Introduction

Background:

•Food availability impacts the occurrence of aggressive behaviors in seabird colonies.

•Common terns (*Sterna hirundo;* Figure 1), are ground-nesting seabirds that populate coastal and inland areas in North America.

•Food availability and feeding success impact fledging rates within colonies[1].

•Aggressive interactions are exhibited by both chicks and adults, can be within or between nest and range in severity.

•Aggressive events can benefit a nest through kleptoparasitic behavior[2] or disadvantage the reproductive success of the nest through infanticide[3].

•We hypothesized that in years when food and reproductive success are high,

Figure 1*:* Adult Common Tern

aggressive behavior between and within nests will lessen and the severity of aggressive interactions will decrease.

Study objective:

•Quantify how aggressive behavior is exhibited and the range of severity in aggression

•Compare the rate of aggression in a year with low reproductive success (2021 fledge rate = mean(SD): 0.33 (0.47) fledged chicks per nest) and a year with high success (2022 fledge rate= mean (SD): 0.96, (0.82) fledged chicks per nest).

Methods

Study Location and Sampling:

•Data were collected from the common tern colony on Seavey island (Figure 5), a small island off the coast of Portsmouth, NH within the Isle of Shoals.

•Archived video data recorded on GoPros of nesting pairs (n=4, 2021; n=4, 2022) were selected and analyzed.

Aggression Severity

•For each aggressive interaction, we recorded specific details:

- •Whether each individual was an adult or chick
- •If the interaction occurred within the nest (between parents and chicks or siblings)
- •If the interaction occurred between nests (involving a neighboring tern)
- •If the interaction involved a feeding (Figure 6)

•We developed an ethogram to numerically rank the severity of aggressive events on a scale of one to four, four being the most severe.

Data Analysis:

•Compared frequency of aggressive events per hour in 2021 and 2022. (Figure 2)

•Compared frequency of food-related aggression in 2021 and 2022. (Figure 3)

•Compared severity of aggression in 2021 and 2022. (Figure 4)

•Explored the roles of adults V.S chicks within and outside of the nests in 2021 and 2022.

Figure 5: Seavey Island colony site (camera setup circled)

Figure 6: feeding between an adult and chick

Figure 7: parent-chick aggression

Results

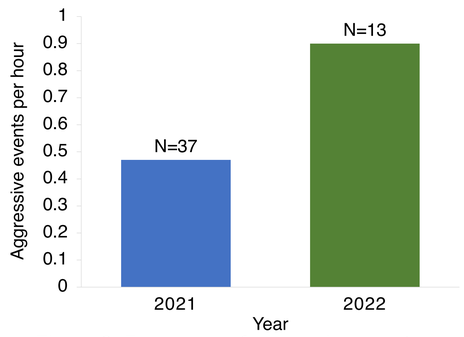

Figure 2: Frequency of aggressive events per hour in 2021 compared to 2022

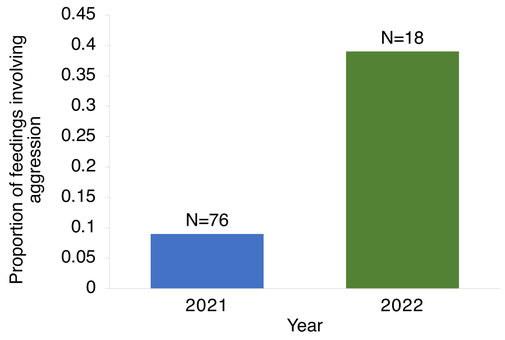

Figure 3: Proportion of feedings involving aggression in 2021 compared to 2022

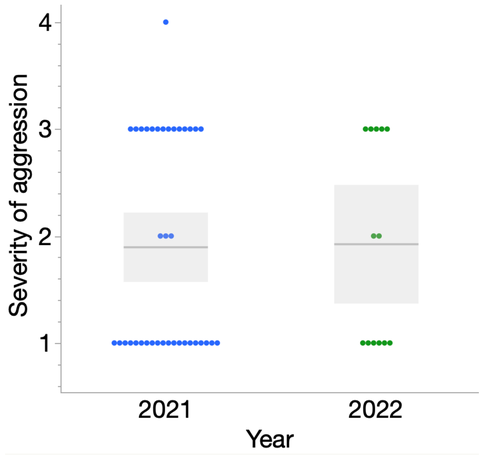

Figure 4: Severity of aggression in 2021 compared 2022 (1=peck, 2=grab, 3=launch, 4=lift)

- In-Nest Aggression (adult vs chick): there was no difference in who was the aggressor or who was the recipient of aggression in 2021 and 2022.
- Between-Nest Aggression (involving neighbors): there was no difference in who was the aggressor or who was the recipient of aggression in 2021 and 2022.
- Severity: infanticidal behavior (Figure 7) was only recorded in 2021.

Discussion

•The year with higher food availability resulted in more aggressive events, a higher frequencies of food-related aggression with a lower severity.

•The year with lower food availability resulted in fewer aggressive events per hour with a higher severity.

•We hypothesized that aggressive events would have a higher frequency in 2021.

• It is logical that aggressive events surrounding feedings would have a higher frequency in 2022 as there was a higher influx of feedings and reproductive success.

•2021 was the only year that ranged to 4 in severity. This may be a result of added stress on nesting pairs from low food availability and nest success rates.

Next Step:

•Looking at nest level observations, collecting more data over a span of years that vary in food availability and reproductive success

Future Impacts:

•Warming waters will cause food availability to fluctuate.

•Local prey depletion, leaving less desirable prey behind, may reduce reproductive success and may also reduce aggression on the colony level.

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